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ACCOUNT

OF SOME

CHALYBEATE PREPARATIONS

IN THE

PHARMACOPŒIA REGIS & REGINÆ IN HIBERNIA.

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MANY years ago, a Physician of deserved eminence in the South of Ireland, remarked to me, that the Tinctura Saturnina of the London Pharmacopœia 1746, had been advantageously employed in the treatment of consumptive* and hectic cases. The same effect was, some time afterwards, confirmed by the report of one of the most experienced and celebrated practitioners in this city, since deceased. In the preparation

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* In the treatment of consumptive diseases the older physicians held Chalybeates in high estimation. The practice has, for some years past, been revived in these countries, where, in such complaints, Griffith's medicine has been extensively employed, and so far as I am capable of judging, with much success. Faber's Quinta Essentia Ferri, for which a Formula is given in Bennet's Theatrum Tabidorum, is nothing more than an operose preparation of acetate of Iron.

preparation of the Tinctura Saturnina, a tincture is extracted by rectified spirit from a mixture of acetate of Lead and sulphat of Iron. Although, from the play of affinities and the solubility of the resulting salts, it appears to the Chemist that this preparation derives its principal efficacy from an acetate of Iron produced by double elective attraction; yet as some of the acetate of Lead appears to escape decomposition,[*] a process (if I mistake not) mentioned by Glauber, occurred to me as much preferable. This consists in extracting a tincture from a mixture of equal weights of acetate of Kali and sulphat of Iron. Such a medicine has been prepared in Dublin since the year 1787 or 1788, and has been found an elegant, agreeable and useful Chalybeate preparation.[*]

If the tincture be made with common rectified spirit, it grows turbid by keeping, and deposits an oxyd of Iron. I found that this does not happen when Alcohol[†] is employed; and accordingly furnished a formula, for the specimen of the Dublin Pharmacopœia, printed in the year 1794, in which Alcohol is directed to be used. Some time afterwards it was observed (I believe, first, by Mr. Watts, an intelligent and correct Apothecary in this city) that a tincture, retaining its transparency on keeping, may be extracted by rectified spirit from

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[*] The Tinctura Saturnina affords an insoluble precipitate by the addition of marine acid.

[†] A teaspoonful or two may be conveniently taken in asses milk.

[‡] That is, vinous spirit of spec. gravity ,815.—This explanation is necessary, as from the less restrained use of the term, in the Pharmacopœia of the Edinburgh College no inconsiderable degree of confusion has affected directions for Pharmaceutical preparations, particularly of that now treated of.

from the same proportion of sulphat of Iron, if double the quantity of acetate of Kali be employed. As Alcohol is seldom to be met with except in the Laboratories of Experimental Chemists, this mode of preparing the medicine came into general use, and it was therefore thought proper to retain it in the Pharmacopœia, published by the Dublin College. It must be observed, however, that the tincture contains not only acetate of Iron, but also acetate of Kali; this is evinced by examining the extract that remains after the spirit is evaporated, which from the predominance of the salt last mentioned, is whitish, whereas the extract of the tincture by Alcohol is of a beautiful crimson colour, and appears to be a very pure acetate of Iron, more perfectly neutralised than most other of the metallic salts. The Alcohol tincture contains more Iron than the tincture by rectified spirit with double acetate of Kali. A drachm measure of this last afforded gr. $\frac{16}{20}$ of prussiate of Iron by precipitation with a pure prussiate of Kali, which scarcely turned blue on the addition of an acid. The same quantity of Alcohol tincture afforded gr. $\frac{23}{20}$ of prussiate of Iron.* In both cases, marine acid was added to separate any prussiate of Iron which the redundant prussiate of Kali might have dissolved. That the tincture does not contain sulphat of Iron, is proved by its not affording a precipitate when a solution of muriate of Barytes is added. This tincture by Alcohol is inserted among the Præparata extemporalia of the Pharmacopœia; from an ounce measure may be obtained by evaporation, with a gentle heat, about

10 grains

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* This result is the mean of two experiments.

10 grains of metallic salt, which does not crystallize, but first assumes the consistence of wax; and then dries, transparent, of the colour before mentioned.

In order to determine the state of oxydation in which Iron dissolves most easily in the acid of Vinegar,

Ten grains of the following substances, viz. Carbonate of Iron, Pharm. Dub. (A)*, Oxydum ferri rubrum, Pharm. Dub. (B), Iron filings (C), scales of Iron (D), were digested with a heat varying from 90 to 150 degrees for four days, each in two drachms measure of acetic acid, spec. gravity 1065, procured by distillation of acetate of Copper. The solutions (designated by the letter annexed to the substance used in the experiment) presented the following appearances:

A. Deep claret colour, somewhat viscid—no residuum.
B. Light red—residuum weighed··············Grs. 8¾
C. Reddish amber colour—residuum·········· 6¾
D. Light amber tinge—residuum·············· 9½

All the residua were washed with distilled water, and dried before weighing, with a heat of about 150.

Hence it appears, that the carbonate of Iron is perfectly soluble in acetic acid, whilst but a small portion of the red oxyd dissolves. Accordingly I have found that the sulphat of Iron exposed to such a degree of heat as converted it in part into red oxyd was less fit for the preparation of the Tinctura

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* This is obtained by decomposing sulphat of Iron by carbonate of Soda.

acetatis ferri.—On this account care should be taken that in drying the mixed salts, according to the processes in the Dublin Pharmacopœia, the heat should not be increased beyond the degree there specified.

The deposition which takes place in the tincture drawn by rectified spirit I supposed might depend on the Iron having attracted oxygen either from the atmosphere or from the water which forms part of the rectified spirit, and thus becoming less soluble in the acetic acid, and conceived that by exposing the mixture to air, so as to satisfy this attraction, the acid would take up such a quantity only of the oxyd as it would afterwards retain in a state of permanent solution. The exposure of the mixed salts to air was accordingly directed in the specimen printed in 1794, with the intention of more effectually preventing the decomposition of the Alc. tincture. Repeated experiments have, since that time, convinced me, that this precaution is unnecessary,* and even detrimental if the mixture be exposed too long to air, especially in the higher temperatures; the reason of this may be inferred from the experiments above-mentioned, which prove that Iron may be so oxydated as to become almost altogether insoluble in acetic acid.

Finding that the tincture in rectified spirit grows turbid in phials stopped so as to exclude the air, I am now inclined to impute the deposition of the oxyd to the reaction of the water contained in the diluted spirit upon the acetic acid of the martial

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* Provided the Alcohol be of the specific gravity before mentioned.

martial salt. Thus, as in the case of the more rapid decomposition of sulphat of Mercury, nitrate of Bismuth, and muriate of Antimony, the acid by its superior affinity for water may deposit a considerable part of the oxyd it formerly held in solution. This opinion appears confirmed by the following experiments:

1st. The Tinctura Acetatis ferri cum Alcohol, Pharm. Dub. which does not affect the colour of Litmus paper, if it be diluted with water immediately reddens it.* The experiment succeeds uniformly if the moistened paper, in both instances, be immediately dried. If the paper dipped in the undiluted Alcohol tincture be exposed some minutes to air, a very slight tinge of red is perceptible, probably in consequence of the extended surface of the Alcohol attracting moisture from the atmosphere.

2d. If the Alcohol tincture be evaporated to an extract and this be dissolved in water, the solution reddens Litmus paper, and after some time deposits an oxyd. It must be however remarked, that the Alcohol tincture remains clear for several days when exposed to air in an open glass, and that even when it is diluted with water so as to redden Litmus, it retains its transparency.

3d. The tincture with rectified spirit, which has grown turbid in close vessels reddens Litmus. The deposited oxyd is so minutely divided, that it is extremely difficult to obtain the liquor clear by filtration.

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* This happens when 3 parts by measure of water are added to 20 of tincture, and more strikingly when equal parts of tincture and water are mixed.

4th. If the salts be mixed in the proportion of Tinctura Acetatis ferri cum Alcohol, Pharm. Dub. and distilled water used instead of Alcohol, the liquor is at first clear, but on standing for some hours it becomes turbid, and at length thickens so as to resemble a jelly. If it be then diluted with an equal quantity of water, it deposits the oxyd copiously; The supernatant liquor reddens Litmus paper strongly.

Hence we may explain why, by increasing the proportion of the acetate of Kali, which has a strong attraction for water, so as to leave this salt superabundant, the tincture in rectified spirit becomes permanent; the water of the rectified spirit being engaged with the salt, is prevented from acting upon the acetic acid of the acetate of Iron, and thus separating it from the oxyd.

An acetate of Iron may be directly procured by digesting precipitated Carbonate of Iron with acetic acid. The solution is of a deep crimson colour. Although the acid be digested, for several days, with more carbonate than it will dissolve, the liquor is still acid. Hence it is not subject to decomposition when mixed with water. I have also mixed it with rectified or even proof spirit, and the mixtures have retained their transparency for several months.

The acetate of Iron is decomposed by heat; acetic acid may therefore be procured by distilling a mixture of equal weights of acetate of Kali and sulphat of Iron; the salts, when mixed deliquesce so as to render it difficult to charge the retort; but by adding sulphat of Kali, reduced to powder in sufficient quantity, the mass acquires consistence, and may be introduced into the retort in small pellets. From an ounce of acetate of Kali and the same quantity of sulphat of Iron and of sulphat of Kali, were obtained grs. 348 of acetic acid, spec. gravity grs. 1040, by distillation with a lamp heat.

TARTAR OF IRON.

Tartar dissolves the oxyd of Iron, and forms with it a triple salt as with the oxyd of Antimony. Precipitated carbonate of Iron was found to answer best; when boiled with Tartar and water in the proportion of the Dublin Pharmacopœia, the salt is obtained in a mass of concreted spicular crystals of an olive colour. This attracts humidity from the air. Its flavour is rather sweetish than sour; the solution however destroys the colour of Litmus.

TINCTURA MURIATIS FERRI.

Having prepared this tincture in the proportions of the London Pharmacopœia, with precipitated carbonate of Iron, I found, that in some instances, when rectified spirit was mixed with the evaporated muriate, crystals of green muriate of Iron deposited, which the spirit did not dissolve. The strength of the tincture was consequently variable. This observation suggested the process of Tinctura muriatis ferri cum oxydo rubro, which is now inserted amongst the Præp. Extemp. of the Dublin Pharmacopœia. The muriatic solution

tion is of an orange red, and does not crystallize when spirit is added.

Instead of evaporating it to a certain weight, which is a troublesome operation, spirit is added so as to bring the liquor to a certain specific gravity, which is the standard of the strength of the medicine.